Claims:

1.

An apparatus for physical exercise or training and with means which provide for a plurality of different workout options simulating human physical movements, comprising:

- an apparatus frame having a crank device mounted thereon, said crank device utilising cardanic motion,
- a pair of crank arms each comprised of at least two parts, a first part being an inner crank arm and a second part being an outer crank arm,
- an inner crank arm axle to which said inner crank arm is rotationally attached,
- a first gear forming a sun gear through which said inner crank arm axle rotatably extends, said first gear being fixedly attached to a crank device frame,
- a second gear rotatably attached to an outer end of the inner crank arm, said outer crank arm at one end fixedly attached to said second gear and at the other end carrying a foot support, said first and seconds gears having a transmission ratio of 2 : 1, and
- means connecting the first and second gears to enable the second gear to revolve around or along the first gear when human force leg force is applied to said foot support,
- a flywheel with or linked to movement braking means,
- a pair of handles stationary linked to the frame or movably linked to rotational movement means on the crank device to cause reciprocal movement of the handles; and
- a first distance defined to be between a foot support attachment location on the outer crank arm and a centre of the second gear being equal to or larger than a second distance defined to be between the centre of the second gear and inner crank axle or centre of the first gear.

2.

An apparatus according to claim 1, wherein the foot supports have means for posture stabilisation thereof relative to the frame throughout a full movement path cycle of said foot supports.

3.

An apparatus according to claim 1 or 2, wherein the crank device has means for adjusting location of the foot supports on the outer crank arm in the course of an ongoing workout session, so to change the size or character of a motion or path.

4.

An apparatus according to claim 1, 2 or 3, wherein the crank device has adjustment means for adjusting during an ongoing workout session an orbital or rectilinear path of said foot rests and its inclination relative to the horizontal.

5.

An apparatus according to anyone of claims 1 – 4, wherein the crank device is operatively linked to a man machine interface system (MMI) and control device for user input and monitoring. (Figs. 19, 20, 25-27, 31-32)

6.

An apparatus according to claim 2, wherein the outer crank arm has means for stabilising the posture of the foot support relative to the frame when the foot support moves along a rectilinear or orbital path, said stabilising means comprising;

- a set of pulleys or gears rotationally attached on the outer crank arm, one pulley or gear of said set connected with the second gear on the inner crank arm and rotational movement transfer means for transferring movement to at least a further pulley or gear of said set at a 1:2 motion, a foot support attached to such further pulley or gear thereby being kept at specified posture relative to the crank device frame. (Figs. 10-13, 33, 36-45)

7.

An apparatus according to claim 1, wherein there are means on the crank device for adjusting the attachment location of the foot support on the outer crank arm said outer crank arm having a number of selectable attachment locations along a length portion of the outer crank arm.

8.

An apparatus according to claim 3, wherein said adjustment means includes an electric motor with gears and/ or a hydraulic system with fluid cylinders. (Figs. 1, 6, 10-16, 36-45)

9.

An apparatus according to claim 4, wherein said adjustment means is adapted to rotationally adjust and lock the first gear relative to the frame. (Figs. 2, 21-23, 31-33, 36-38,44-45)

10.

An apparatus according to claim 9, wherein said adjustment means for the first gear comprises a lever fixedly attached to the first gear, said lever capable through movement thereof to rotate the first gear, said lever has a locking function for positionally stabilising the first gear relative to the frame. (Figs. 2, 21-23, 31-33, 36-38, 44-45)

11.

An apparatus according to claim 4, 9 or 10, wherein the foot supports are attached to the foot support attachment means on the outer crank arm, wherein said foot supports are caused to stay in an original oriented, e.g. horizontal, position throughout an operation cycle of the outer crank arm, wherein a first inner cog wheel is fixed to the frame, wherein the first inner cog wheel is operatively engaged with a second inner cog wheel by means of a chain, wherein the second inner cog wheel is fixed relative to a pulley or said second gear on the outer crank arm, said pulley or second gear being

interactive with at least a further pulley or gear on the outer crank arm to provide said attachment means. (Figs. 21d – 21e )

12.

An apparatus according to claim 11, wherein a transfer ratio between said first inner cog wheel and the pulleys or gears to which the foot supports are attached is 1:1, wherein a transfer ratio between the first and second inner cog wheels is 2:1, and wherein a transfer ratio between said pulley or said second gear and said further pulley or gear on the outer crank arm is 1:2. (Figs. 21d – 21e, figs 22a-22c.)

13.

An apparatus according to claim 2, wherein the crank device comprises:

- a first cog wheel which is rotationally attached on the outer crank arm, the first cog wheel being connected with the second gear on the inner crank arm for transferring a 1: 2 ratio motion to a second cog wheel on the outer crank arm through use of a chain, said second cog wheel having attachment means for the foot support, said the outer crank arm having a third cog wheel with alternative attachment means for the foot support, said third cog wheel linked to the second cog wheel with a chain at a transfer ratio 1:1. (Figs. 12-13)

14.

An apparatus according to claim 2, wherein a first worm gear is rotationally fixed on the outer crank arm, stationary relative to the inner crank arm, to transferring a 4:1 motion to at least a second worm gear which in turn transfers a 1:8 motion to a third worm gear with attachment means for the foot support, the gear ratio between the first and third worm gears being a 1:2 ratio. (Figs. 36-45)

15.

An apparatus according to claim 2, wherein the adjustment means comprise a first adjustment gear located relative to the crank device frame for receiving externally applied activating movements, said first adjustment gear connected to a second adjustment gear located on the inner crank arm , said second adjustment gear connected

to a fourth adjustment gear through engagement with a third adjustment gear the fourth adjustment gear in a fixed attachment with a fifth adjustment gear which has a sixth adjustment gear unit connected to threaded bolts which in turn are connected to a foot supporting piece which is slidable relative to the outer crank arm. (Figs. 36-45)

16.

An apparatus according to anyone of claims 1 or 2, wherein the foot supports have means for controlling their angle relative to the horizontal through a full cycle of movement path of the foot supports, wherein said controlling means consist of a third gear attached to the foot support axle, said third gear engaging a fourth gear attached to the outer crank axle through belt or chain, and wherein the fourth gear is fixed on an axle which extends through the inner crank arm to a fifth gear driven by a further chain or belt in engagement with a non-rotatable fifth gear on the frame. (Figs. 11a-11b)

17.

An apparatus according to claim 2, wherein the foot supports have means for controlling their angle relative to the horizontal through full cycle of movement path of the foot supports, wherein said controlling means consist of a first conical gear attached to the pedal axle, said first conical gear engaging a second conical gear attached to the outer crank axle through a rigid or telescopic drive axle with conical gears at either end thereof, and wherein the second gear is fixed on an axle which extends through the inner crank arm to a third gear driven by a second chain or belt in engagement with a non-rotatable fourth gear on the frame. (Figs. 11c-11d)

18.

An apparatus according to claim 1 or 2, wherein said foot supports are foot platforms or pedals provided with an actuable tilt function being transverse of movement direction of the foot support. (Figs. 17,18,46-47)

19.

An apparatus according to claim 18, wherein the foot support is a platform is fixed to a supportive platform frame, wherein the frame is tiltable and fixedly attached to a body with an axle, tilt motion being limited by a bolt and a curved track, the curved track

having at a location there-along an recess into which the bolt is forced by a spring, the bolt position being controlled by a lever which has two positions, the first position forcing the bolt into the curved track to give a tilt motion to the platform, and the second position relieving the force on the bolt to make the spring to force the bolt into the track recess . (Figs. 46-47)

20.

An apparatus according to anyone of claims 1, 2, and 19, wherein said foot support means are foot platforms or pedals with a toe - heel tilt function means providing tilt motion being parallel to movement direction of the foot support, tilt motion occurring at transitional positions providing a change of foot support movement direction during a revolution of the crank arms. (Figs.48-54)

21.

An apparatus according to claim 20, wherein the foot support is a platform attachable to a platform frame which is hinged to a supportive body with a cylindrical room which comprise a cylinder attached to inside walls through use of bearings, the cylinder having a boss for stationary attachment to a crank arm, the boss and cylinder being hollow for a bolt stationary attached to the body, the bolt being made for attachment to a crank arm means for stabilising a momentary posture of the platform, platform frame having a circular hole with a peg and a spring, wherein a ring attached in an offset manner around the cylinder is located, and wherein a rotation of the crank keeps the platform at set posture, and wherein the cylinder rotates relative to the supportive body and platform frame, making the ring rocking the frame as result of the rotation of the ring and its contact with the peg and spring, the ring set at such angle that a rotation of the crank creates a tilt upwards of a toe end of the platform at the most forward position of the movement path of the foot support and a tilt upwards of the heel end of the platform at the rear position of the platform path. (Figs. 48-54)

22.

An apparatus according to claim 1, wherein the crank device is connected to means of physical resistance, said means comprising a flywheel connected to a rotating part of the crank device by belt and pulleys, and wherein an eddy current brake system provides brake force to the flywheel. (Figs. 3-4, 31-33)

23.

An apparatus according to claim 1 or 16, wherein the centre crank axle is positioned through a first wheel having means to drive the flywheel, the flywheel positioned in a space between the inner crank arms and rotatable around the centre crank axle, said drive means being a second wheel tensioned to the first wheel through use of a second axle and connected to a third wheel operative with a belt or chain for distributing rotation of the crank to a fourth wheel on the flywheel. (Figs. 1-4)

24.

An apparatus according to claim 1 or 16, wherein the centre crank axle is positioned through a first wheel having means to drive a flywheel positioned with its axis of rotation parallel to the first wheel, and wherein the drive means comprises a second wheel tensioned relative to the first wheel and attached to a second axle which is connected to a third wheel operative with a belt or chain for distributing rotation of the crank to a fourth wheel on the flywheel. (Fig. 5)

25.

An apparatus according to claim 1, claim 23 when dependent on claim 1, or claim 24 when dependent on claim 1, wherein said movement braking means capable of interacting on the flywheel for applying a braking or rotational speed retard force is electable from one of:

- a friction belt, a brake shoe unit, an electro magnetic device, and eddy-current based device. (Figs.1-5, 31-33)

26.

An apparatus according to claim 1, wherein the crank device is connected to a flywheel providing physical resistance , the flywheel being connected to a rotating part of the crank device by means of belt and pulleys, and wherein an electric DC motor through use of adjustable power supply is able to provide either movement brake force or drive force to the flywheel. (Figs. 63-65)

27.

An apparatus according to claim1, wherein the crank device is connected to means for driving, said means comprising a motor connected to a rotating part of the crank device by belt and pulleys or directly with gears, and wherein an electric motor provides drive force to the crank arms.
(Figs. 61 and 62)

28.

An apparatus according to claim 1, wherein the apparatus has means for measuring, processing a display related to the weight of a user, weight scale technology means and related sensors being located at one of the following locations on the apparatus:

- apparatus floor supports;
- in a part of the frame which carries the main crank axle
- on foot supporting means. (Fig. 32b)

29.

An apparatus according to claim1, wherein the apparatus has means for providing a tilt motion to a main frame of the apparatus transversely of a longitudinal direction of the apparatus. (Fig. 32b)

30.

An apparatus according to claim 29, wherein the means for providing a tilt motion comprise a support with curved cross-section located underneath the frame between the frame and a floor on which the apparatus is placed and in said longitudinal

direction, and spring means attached to the frame on either side of the support. (Fig. 32b)

31.

An apparatus according to claim 1, wherein one end of a pair of rods is connected to a circular, eccentrically moving part on the crank device, and wherein the other end of the rods are operative with a pair of said reciprocable handles, movement of said handles being continuously related to the operation of the crank device powered via pushing force applied to said foot supports. (Figs. 20, 25, 31-35)

32.

An apparatus according to claim 31, characterized in that the rods operative with said the handles are connected to the crank device at a location between the inner crank arms thereof. (Figs. 19, 20, 25)

33.

An apparatus according to claim 1 or 2, wherein the crank device has adjustment means for adjusting an orbital or rectilinear path of said foot rests and its inclination relative to the horizontal, the crank device tiltably attached to the frame, and wherein a threaded bolt linked to the frame keeps the crank device in position, turning of the bolt causing the crank device to be tilted. (Fig. 20c)

34.

An apparatus according to claim 33, wherein turning of the bolt is assisted by a motor , suitably via a drive gear.

35.

An apparatus according to claim 1 or 5, wherein the size of the orbit or path of the foot supports is adjustable depending on speed of crank rotation and speed of foot support travel along the path, wherein the MMI system includes sensors and processing means, said system processing signals to actuate a motor or pump to adjust the location of foot supports on the outer crank arms. (Fig. 16)

36.

An apparatus according to claim 5, wherein the size of the orbital or rectilinear path of the foot supports is adjustable by an apparatus user through use of a display provided with a keypad or touch screen. (Figs. 16, 24)

37.

A training or exercise apparatus according to claim 5, wherein the man machine interface (MMI) system has input, control and adjustment means related to one or more of:

- paths of motion or style of training related to walking, jogging, running, climbing or skiing;
- stride length,
- angle of orbital or rectilinear path relative to the horizontal;
- level of brake force acting on the flywheel,
- personal workout levels,
- caloric burn rates,
- heart or pulse rate,
- physical condition of user and
- weight and height. (Fig. 55)

38.

An apparatus according to claim 1, wherein the frame has two crank devices utilising cardanic motion, wherein the outer crank arms are linked together for synchronised operation through use of connecting bars, said bars providing means for foot support. (Fig. 56)

39.

An apparatus according to claim 1, wherein the frame has one crank device utilising cardanic motion and a second crank wheel, wherein outer crank arm on the crank

device is articulated linked with a connecting bar which is slidably connected with slide means on the crank wheel, said bars forming means for foot support. (Fig. 57)

40.

An apparatus according to claim 1, wherein the frame has one crank device utilising cardanic motion and a second crank wheel, wherein outer crank arm on the crank device is articulated and slidably linked to a connecting bar which is rotatably connected to the crank wheel, said bars forming means for foot support. (Fig. 58)

41.

An apparatus according to claim 1, wherein outer crank arm on the crank device is articulated and slidably linked to a connecting bar , which is rotatably, connected a rear part of the apparatus frame, said bars forming means for foot support. (Fig. 59)

42.

An apparatus according to claim 1, wherein the frame has one crank device utilising cardanic motion and a second crank wheel, and wherein outer crank arm on the crank device is articulated linked with a connecting bar , which is rotatably connected with the crank wheel, said member forming means for foot support. (Fig. 60)

43.

An apparatus according to claim 39, 41 or 42, wherein the crank device and the crank wheel have synchronised motion as regards rotation cycle period.

44.

An apparatus according to anyone of claims 38 - 41, wherein a pair of handles is operatively linked to a forward end of the connecting bars, respectively, said par of handles being pivoted to an upright member on the apparatus frame, whereby the handles exhibit a reciprocal tilting movement when the connecting bars move during a rotation cycle of said crank device(s).

45.

A foot support for use with a stationary apparatus for physical exercise, said apparatus having a crank device with outer crank arms, wherein the foot support in one operational position is non-tiltable sideways relative to its crank caused direction of movement, and wherein the foot support in a second operational position is tiltable sideways relative to its crank caused direction of movement.

46.

A foot support for use with an a stationary apparatus for physical exercise, said apparatus having a crank device with outer crank arms, wherein the foot support is a foot supporting platform interactive with posture control means in said crank device to retain the foot support in tan unchanged posture, e.g. horizontal, throughout an entire path cycle of the foot support.

47.

A crank device for use with an apparatus for physical exercise, said crank device connectable to foot supports for a user in order to drive the crank device, said device comprising:

- a pair of crank arms each comprised of at least two parts, a first part being an inner crank arm and a second part being an outer crank arm,
- an inner crank arm axle to which said inner crank arm is rotationally attached,
- a first gear forming a sun gear through which said inner crank arm axle rotatably extends, said first gear being fixedly attached to a crank device frame,
- a second gear rotatably attached to an outer end of the inner crank, said outer crank arm at one end fixedly attached to said second gear and at the other end carrying said foot support, said first and seconds gears having a transmission ratio of 2 : 1, and means connecting the first and second gears to enable the second gear to revolve around or along the first gear when human force leg force is applied to said foot support, wherein a first distance defined to be between a foot support attachment point on the outer crank arm and a centre of the second gear is equal to or larger than a second distance defined to be between the centre of the second gear and inner crank axle or centre of the first gear.

(Fig. 1-45)

48.

A crank device according to claim 47, wherein said first gear is a sun gear, said first gear having means attached thereto for rotational positional adjustment relative to said crank device frame.

49.

A crank device according to claim 47 or 48, wherein said means rotationally interconnecting said first and second gears comprises one of:

- at least two intermediate gears attached to said inner crank arm,
- a set of cog wheels interacting with chains or toothed belts,
- a set of pulleys and connected belts,
- at least a pair of conical gear units with interconnecting rigid or extendible.

(Figs. 1,8-9)

50.

A crank device according to claim 47, wherein the first gear is located in a housing and formed inwardly directed gear teeth, wherein the inner crank arm is at one end rotationally supported at a centre of the first gear and at the other end supporting the second gear to enable the second gear to rotate along the toothed inner perimeter of the housing forming said first gear, and wherein the outer crank arm being fixedly attached to the second gear has said first dimension substantially longer than the second dimension. (Figs. 28-29)

51.

A crank device according to claim 50, wherein the ratio between said first dimension and said second dimension ranges from approximately 2:1 to 5:1.

52.

A crank device according to claim 48, wherein said adjustment means for the first gear comprises a lever fixedly attached to the first gear, said lever capable through

movement thereof to rotate the first gear, said lever has a locking function positionally stabilising the first gear relative to the frame. (Figs. 2, 21-23)

53.

A crank device according to claim 52, wherein the lever operable by means of a motor via a geared transmission, and wherein adjustment operation of the lever adjusts angle of motion and path described by said foot supports.

54.

A crank device according to any one of claims 47 – 53, wherein said foot supports are foot platforms or pedals provided with an actuable tilt function being transverse of movement direction of the foot support. (Figs. 17,18,46-47)

55.

A crank device according to anyone of claim 47- 54, wherein said foot support means are foot platforms or pedals with a toe - heel tilt function means providing tilt motion being parallel to movement direction of the foot support, tilt motion occurring at transitional positions providing a change of foot support movement direction during a revolution of the crank arms. (Figs. 48-54)

56.

A crank device according to anyone of claims 47- 52, wherein the outer crank arm has means for stabilising the posture of the foot support relative to the frame when the foot support moves along a rectilinear or orbital path, said stabilising means comprising;

- a set of pulleys or gears rotationally attached on the outer crank arm, one pulley or gear of said set connected with the second gear on the inner crank arm and rotational movement transfer means for transferring movement to at least a further pulley or gear of said set at a 1:2 motion, a foot support attached to such further pulley or gear thereby being kept at specified posture relative to the crank device frame throughout a full cycle of movement of the foot support.

(Figs. 10-13, 33, 36-45)

57.

A crank device according to claims 47 - 55, wherein the outer crank arm has means for stabilising the posture of the foot support relative to the frame when the foot support moves along a rectilinear or orbital path, said stabilising means comprising:

- a first cog wheel which is rotationally attached on the outer crank arm, the first cog wheel being connected with the second gear on the inner crank arm for transferring a 1: 2 ratio motion to a second cog wheel on the outer crank arm through use of a chain, said second cog wheel having attachment means for the foot support, said the outer crank arm having a third cog wheel with alternative attachment means for the foot support, said third cog wheel linked to the second cog wheel with a chain at a transfer ratio 1:1 . (Figs. 12-13)

58.

A crank device according to claim 56 or 57, wherein a first worm gear is rotationally fixed on the outer crank arm, stationary relative to the inner crank arm, to transferring a 4:1 motion to at least a second worm gear which in turn transfers a 1:8 motion to a third worm gear with attachment means for the foot support, the gear ratio between the first and third worm gears being a 1:2 ratio. (Figs. 36-45)

59.

A crank device according to anyone of claims 47- 55, wherein the foot supports have means for controlling their angle relative to the horizontal through a full cycle of movement path of the foot supports, wherein said controlling means consist of a third gear attached to the foot support axle, said third gear engaging a fourth gear attached to the outer crank axle through belt or chain, and wherein the fourth gear is fixed on an axle which extends through the inner crank arm to a fifth gear driven by a further chain or belt in engagement with a non-rotatable fifth gear on the frame. (Figs. 11a-11b)

60.

A crank device according to anyone of claims 47-55, wherein the foot supports have means for controlling their angle relative to the horizontal through full cycle of movement path of the foot supports, wherein said controlling means consist of a first

conical gear attached to the pedal axle, said first conical gear engaging a second conical gear attached to the outer crank axle through a rigid or telescopic drive axle with conical gears at either end thereof, and wherein the second gear is fixed on an axle which extends through the inner crank arm to a third gear driven by a second chain or belt in engagement with a non-rotatable fourth gear on the frame. (Figs. 11c-11d)

61.

A crank device according to claim 47, wherein the first dimension of the outer crank arms relative to the second dimension of the inner crank arms defines the size, shape and direction of foot supports movement path when set in motion. (Fig. 6)

62.

A crank device according to claim 61, wherein the size of orbital or rectilinear path of the foot supports is defined as the relation between path length = PL and path height = PH, wherein the first dimension length of outer crank arm = OCAL, wherein the second dimension length of the inner crank arm = ICAL, and wherein the movement path of the foot supports is defined as a function of: PL = 2 x ICAL + 2 x OCAL and PH = 2 x OCAL – 2 x ICAL. (Fig. 6)

63.

A crank device according to claim 62, wherein when OCAL > ICAL and when outer crank arms are set in motion, the foot supports provide the foot supports with an elliptical orbital path and with movement there along in an opposite movement direction of the inner crank arms and axle. (Fig. 6)

64.

A crank device according to claim 62, the foot support motion will follow a straight line when OCAL = ICAL. (Fig. 6)

65.

A crank device according to anyone of claims 47-52 and 61 - 64, wherein there are adjustment means on the crank device for adjusting on the outer crank arm the distance

between attachment location for the foot support and location of attachment of the outer crank arm to the second gear, the adjustment means comprising one of:

- an electric motor on the outer crank arm with gears and/ or threaded bolts
- a hydraulic system with fluid cylinders,
- a number of attachment locations along the length of the outer crank arm for selective attachment of the foot support. (Fig. 1, 6, 12-15, 36-45)

66.

A crank device according to claim 65, wherein the adjustment means comprise a first adjustment gear located relative to the crank device frame for receiving externally applied activating movements, said first adjustment gear connected to a second adjustment gear located on the inner crank arm, said second adjustment gear connected to a fourth adjustment gear through engagement with a third adjustment gear the fourth adjustment gear in a fixed attachment with a fifth adjustment gear 420 which has a sixth adjustment gear unit connected to threaded bolts which in turn are connected to a foot supporting piece which is slidable relative to the outer crank arm. (Figs. 36-45 )

67.

A crank device according to any of the claims 47-52 and 61 - 64, wherein the crank device is connected to means of physical resistance, said means comprising a flywheel connected to a rotating part of the crank device by belt and pulleys, and wherein an eddy current brake system provides brake force to the flywheel. (Fig.3-4, 31-33)

68.

A crank device according to claim 54, wherein the foot support is a platform is fixed to a supportive platform frame, wherein the frame is tiltable and fixedly attached to a body with an axle, tilt motion being limited by a bolt and a curved track, the curved track having at a location there-along an recess into which the bolt is forced by a spring, the bolt position being controlled by a lever which has two positions, the first position forcing the bolt into the curved track to give a tilt motion to the platform, and the second position relieving the force on the bolt to make the spring to force the bolt into the track recess. (Fig. 46-47)

69.

A crank device according to claim 55, wherein the foot support is a platform attachable to a platform frame which is hinged to a supportive body with a cylindrical room which comprise a cylinder attached to inside walls through use of bearings, the cylinder having a boss for stationary attachment to a crank arm, the boss and cylinder being hollow for a bolt stationarily attached to the body, the bolt being made for attachment to a crank arm means for stabilising a momentary posture of the platform, platform frame having a circular hole with a peg and a spring, wherein a ring attached in an offset manner around the cylinder is located, and wherein a rotation of the crank keeps the platform at set posture, and wherein the cylinder rotates relative to the supportive body and platform frame, making the ring rocking the frame as result of the rotation of the ring and its contact with the peg and spring, the ring set at such angle that a rotation of the crank creates a tilt upwards of a toe end of the platform at the most forward position of the movement path of the foot support and a tilt upwards of the heel end of the platform at the rear position of the platform's path.

70.

A crank device for use with an apparatus for physical exercise, said crank device connectable to foot supports for a user in order to drive the crank device, said device comprising:

- a pair of crank arms each comprised of at least two parts, a first part being an inner crank arm and a second part being an outer crank arm,
- an inner crank arm axle to which said inner crank arm is rotationally attached,
- a first gear forming a sun gear through which said inner crank arm axle rotatably extends, said first gear being fixedly attached to a crank device frame,
- a second gear rotatably attached to an outer end of the inner crank arm, said outer crank arm at one end fixedly attached to said second gear and at the other end carrying said foot support, said first and seconds gears having a transmission ratio of 2 : 1, and

- means connecting the first and second gears to enable the second gear to revolve around or along the first gear when human force leg force is applied to said foot support,

wherein the outer crank arm has means for stabilising posture of the foot support relative to the frame throughout a full cycle of a path followed by said foot support, said stabilising means comprising :

- a set of pulleys or gears rotationally attached to the outer arm, and linked with the inner crank arm for transferring a 1:2 motion ratio to the foot support to maintain said stabilised posture, and movement transferring means between said pulleys or gears. (Fig. 10-16, 21-23, 31-33, 36-45)

71.

A crank device according to claim 70, wherein a first cog wheel is rotationally attached on the outer crank arm, the first cog wheel being connected with the second gear on the inner crank arm for transferring a 1:2 motion to a second cog wheel on the outer crank arm through use of a chain, said second cog wheel having attachment means for the foot support, the outer crank arm having a third cog wheel with alternative attachment means for the foot support, said third cog wheel linked to the second cog wheel with a chain at transfer ratio 1:1 (Fig. 12-13)

72.

A crank device according to claim 72 or 73, wherein a first worm gear is rotationally fixed on the outer crank arm, stationary relative to the inner crank arm, to transferring a 4:1 motion to at least a second worm gear which in turn transfers a 1:8 motion to a third worm gear with attachment means for the foot support, the gear ratio between the first and third worm gears being a 1:2 ratio. (Fig. 36-45)

73.

A crank device according to anyone of claims 70 - 72, wherein the foot supports have means for controlling their angle relative to the horizontal through a full cycle of

movement path of the foot supports, wherein said controlling means consist of a third gear attached to the foot support axle, said third gear engaging a fourth gear attached to the outer crank axle through belt or chain, and wherein the fourth gear is fixed on an axle which extends through the inner crank arm to a fifth gear driven by a further chain or belt in engagement with a non-rotatable fifth gear on the frame. (Fig. 11a-b)

74.

A crank device according to anyone of claims 70-72, wherein the foot supports have means for controlling their angle relative to the horizontal through full cycle of movement path of the foot supports, wherein said controlling means consist of a first conical gear attached to the pedal axle, said first conical gear engaging a second conical gear attached to the outer crank axle through a rigid or telescopic drive axle with conical gears at either end thereof, and wherein the second gear is fixed on an axle which extends through the inner crank arm to a third gear driven by a second chain or belt in engagement with a non-rotatable fourth gear on the frame. (Fig. 11c-d)

75.

A crank device according to anyone of claims 70-74, wherein there are adjustment means on the crank device for adjusting on the outer crank arm the distance between attachment location for the foot support and location of attachment of the outer crank arm to the second gear, the adjustment means comprising one of:

- an electric motor on the outer crank arm with gears and/or threaded bolts,
- a hydraulic system with fluid cylinders,
- a number of attachment locations along the length of the outer crank arm for selective attachment of the foot support. (Fig. 1, 6, 12-15, 36-45)

76.

A crank device according to claim 75, wherein the adjustment means comprise a first adjustment gear located relative to the crank device frame for receiving externally applied activating movements, said first adjustment gear connected to a second adjustment gear located on the inner crank arm , said second adjustment gear connected to a fourth adjustment gear through engagement with a third adjustment gear, the fourth

adjustment gear in a fixed attachment with a fifth adjustment gear 420 which has a sixth adjustment gear unit connected to threaded bolts which in turn are connected to a foot supporting piece which is slidable relative to the outer crank arm. (Figs. 36-45)

77.

A crank device according to claim 70 where the first gear has means for a rotational positional setting adjustment relative to the frame. (Fig. 2, 21-23,36-38, 44-45)

78.

A crank device according to claim 71, wherein said adjustment means for the first gear comprises a lever fixedly attached to the first gear, said lever capable through movement thereof to rotate the first gear, said and lever has a locking function positionally stabilising the first gear relative to the frame. (Fig. 2, 21-23,36-38, 44-45)

79.

A crank device according to any one of claims 70– 78, wherein said foot supports are foot platforms or pedals provided with an actuable tilt function being transverse of movement direction of the foot support. (Fig. 17,18,46-47)

80.

A crank device according to claim 79, wherein the foot support is a platform is fixed to a supportive platform frame, wherein the frame is tiltable and fixedly attached to a body with an axle, tilt motion being limited by a bolt and a curved track, the curved track having at a location there-along an recess into which the bolt is forced by a spring, the bolt position being controlled by a lever which has two positions, the first position forcing the bolt into the curved track to give a tilt motion to the platform, and the second position relieving the force on the bolt to make the spring to force the bolt into the track recess . (Fig. 46-47)

81.

A crank device according to anyone of claim 70- 80, wherein said foot support means are foot platforms or pedals with a toe - heel tilt function means providing tilt motion

being parallel to movement direction of the foot support, tilt motion occurring at transitional positions providing a change of foot support movement direction during a revolution of the crank arms. (Fig.48-54)

82.

A crank device according to claim 81, wherein the foot support is a platform attachable to a platform frame which is hinged to a supportive body with a cylindrical room which comprise a cylinder attached to inside walls through use of bearings, the cylinder having a boss for stationary attachment to a crank arm, the boss and cylinder being hollow for a bolt stationarily attached to the body, the bolt being made for attachment to a crank arm means for stabilising a momentary posture of the platform, platform frame having a circular hole with a peg and a spring, wherein a ring attached in an offset manner around the cylinder is located, and wherein a rotation of the crank keeps the platform at set posture, and wherein the cylinder rotates relative to the supportive body and platform frame, making the ring rocking the frame as result of the rotation of the ring and its contact with the peg and spring, the ring set at such angle that a rotation of the crank creates a tilt upwards of a toe end of the platform at the most forward position of the movement path of the foot support and a tilt upwards of the heel end of the platform at the rear position of the platform's path. (Fig.48-54)

83.

A crank device according to anyone of the claims 70 - 82, wherein the crank device is connected to means of physical resistance, said means comprising a flywheel connected to a rotating part of the crank device by belt and pulleys, and wherein an eddy current brake system provides brake force to the flywheel. (Fig.3-4, 31-33)